

In the Claims

1 1. (currently amended) A digital receiver for detecting symbols in a
2 baseband signal in a DS-CDMA network, comprising:
3 a plurality of spaced apart antennas;
4 a time-frequency rake receiver connected to each of the antennas,
5 wherein a frequency offset is estimated by identifying a location of
6 contributing symbols with a smallest error signal;
7 an interference canceller connected to each output of each of the rake
8 receiver, each interference canceller producing a contributing symbol in
9 parallel, wherein the outputs of each interference canceller include an error
10 signal and one contributing symbol; and
11 a diversity combiner to determine a decision symbol from the plurality
12 of contributing symbols, the decision symbol corresponding to the baseband
13 signal.

1 2. (original) The receiver of claim 1 wherein the antennas are spaced about
2 three to five times the wavelength of the baseband signals.

1 3. (original) The receiver of claim 1 wherein each rake receiver includes a
2 plurality of rake fingers, and wherein the baseband signal received at each
3 antenna is modulated to a plurality of different frequencies, one frequency
4 for each of the plurality of rake fingers.

1 4. (currently amended) The receiver of ~~claim 1~~ claim 3 wherein each rake
2 finger has a different time delay.

1 5. (currently amended) The receiver of claim 4 ~~wherein a symbol time is T_b ,~~
2 ~~and~~ wherein the output of each rake finger is sampled at symbol times T_b to
3 form a down-sampled signal for each interference canceller.

1 6. (currently amended) The receiver of claim 5 wherein each interference
2 canceller ~~further~~ comprises:
3 an adaptive filter to receive a real part ($Re(*)$) of the down-sample
4 signal $u_{i,j}$, the adaptive filter including a plurality of taps, each tap having a
5 tap weight, and wherein the tap weights are update every symbol time T_b
6 according to a least mean square process.

1 7. (original) The receiver of claim 6 wherein a sign of an output of the
2 adaptive filter is a reference signal subtracted by the adaptive filter.

1 8. (original) The receiver of claim 7 wherein the reference signal is a
2 training signal during an initial training stage.

1 9. (original) The receiver of claim 8 wherein the training signal is a
2 predetermined random sequence generated by using a polynomial known to
3 the receiver.

1 10. (canceled)

1 11. (currently amended) The receiver of claim 1 wherein the diversity
2 combiner combines all contributing symbols $C_{i,j}$ with different weights
3 according to the error signals $E_{i,j}$, and the decision symbol d 109 is defined
4 by

5
$$d = \text{sgn} \left\{ \sum_{i=1}^M \sum_{j=1}^N \alpha_{i,j} C_{i,j} \right\},$$

6 where α_i is a weighting factor

7
$$\alpha_{i,j} = \frac{\sum_{i=1}^M \sum_{j=1}^N E_{i,j}}{E_{i,j}},$$

8 where M is the number of antennas, and ~~(N-1)~~ N is the number of frequency
9 shifts at each antenna.

1 12. (currently amended) The receiver of ~~claim 6~~ claim 8 wherein a
2 transmitter periodically transmits the training signal to establish initial tap
3 weights for adaptive filter of each interference canceller.

1 13. (cancelled)

1 14. (currently amended) The receiver ~~in claim 10~~ of claim 1 wherein the
2 decision signal has a smallest error signal.

1 15. (currently amended) The receiver ~~in claim 10~~ of claim 1 wherein the
2 decision signal has a highest signal-to-noise ratio.

1 16. (currently amended) A method for detecting symbols in a baseband
2 signal in a DS-CDMA network, comprising:
3 receiving the baseband signal by a plurality of spaced apart antennas;
4 frequency shifting the baseband signal received at each antenna;
5 down sampling each frequency shifted baseband signal at sample
6 times T_b ,
7 adaptively filtering each down sampled signal to produce a
8 ~~contributing~~ contributing symbols in parallel; and
9 combining the plurality of contributing symbols to determine a decision
10 symbol corresponding to the baseband signal.